

CRAYFISHES OF THE CHEAT RIVER WATERSHED WEST VIRGINIA AND PENNSYLVANIA PART I. SPECIES AND LOCALITIES¹

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Subsequent to a comprehensive survey of the fish fauna of the Cheat River watershed of the Monongahela-Ohio River systems in West Virginia, it was possible, during the period of March 30 to July 20, 1956, to obtain a similar insight into the stream crayfish fauna of this watershed. Although the main field efforts occurred between the dates cited, sporadic collections were made as late as October 14, 1956.

The subject matter, because of the magnitude of the data on localities, ecology, and abundance, has been broken into two parts; Part I deals with the species, localities and distribution records while Part II will deal with the ecology, physiography, and explanations of the species distributions found in this watershed. As will be discussed in more detail in Part II, barriers, pollution, topography and other ecological factors have all contributed heavily in determining the distributions of the crayfishes within this area of West Virginia.

The crayfish faunas, as is true of other animal faunas, have received little study in West Virginia. Through the efforts of field excursions by Faxon (1914), Hay (1899, 1902), Ortmann (1905, 1906, 1913, 1931), Turner (1926) and Williamson (1901) into the state or parts of the Monongahela system, while studying the crayfish faunas of Maryland, Pennsylvania, Ohio and elsewhere, knowledge exists of the crayfishes of West Virginia. Newcombe's (1924) effort stands as the only work which attempts to compile a list of the crayfishes from all systems of the state. Since that time there have been few if any efforts to collect or study the crayfishes either of a part or of the entire state.

The Data

Collections and numbers.—Generally, collections were made downstream from south to north to take advantage of receding water levels with the advent of summer. All numbers cited herein bear an FJS connotation and run consecutively from 437–667, with sporadic additions. The 20 early collections of 383 specimens, dating 1890–1905, of *Cambarus bartoni carinirostris* bear U.S.N.M. labels and are so noted. A total of 233 collections comprised of two species totaling 1424 specimens was made throughout the six counties included in the watershed. Fifteen collections were made within the Fayette County, Pennsylvania, portion of the watershed. West Virginia collections, by county, were: Monongalia 3, Pocahontas 8, Preston 76, Randolph 51 and Tucker 80. Of these collections 153 (66%) contained crayfish while 80 (34%) did not. *Cambarus b. bartoni* occurred alone in 138 collections. *Orconectes obscurus* was found alone in 34 collections. *C. b. bartoni* and *O. obscurus* occurred together in only 19 collections. Those collections marked by an asterisk (*) did not possess crayfish samples. The localities are indicated on figure 1, which depicts the Cheat River watershed of West Virginia and Pennsylvania and its position in relation to the remainder of West Virginia.

Likewise, in order to handle the mass of data, the locality, ecological data, the number, sex and form of each species captured at a locality has been placed together to permit closer scrutiny of the conditions affecting the abundance or presence of each species.

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The Crayfishes

Cambarus bartoni bartoni.—*C. b. bartoni* appeared within the Cheat River watershed in 138 collections: Pennsylvania, Fayette County 13; West Virginia, Monongalia County 2, Pocahontas County 4, Preston County 40, Randolph County 39, Tucker County 40. Within these series of collections there were 1155 specimens of *bartoni* represented by 575 form I males, 44 form II males and 536 females. This species was thus not only the most abundant of the two actually captured during the survey but was also the most widespread. However, close scrutiny of the distribution data will illustrate the absence of this species from the highly polluted center of the watershed.

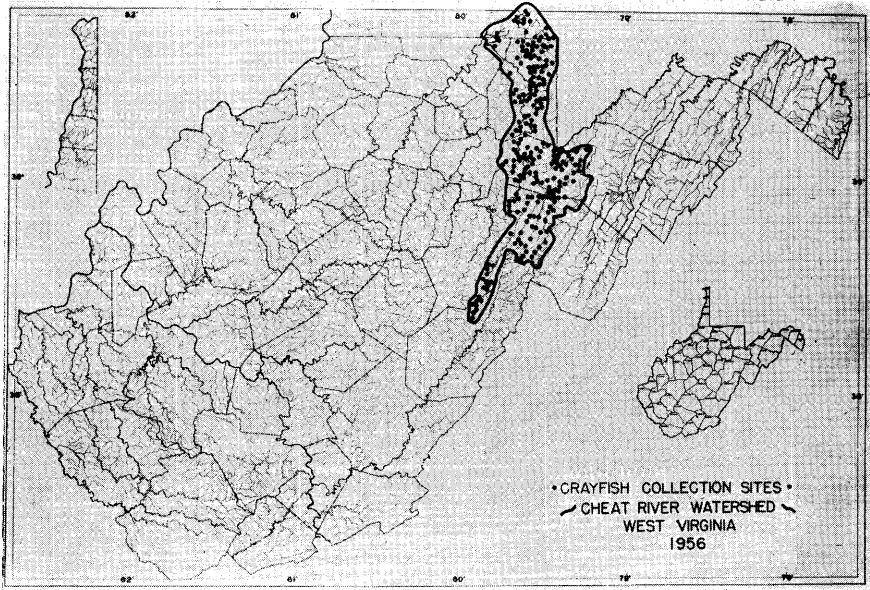


FIGURE 1. Location of the Cheat River Watershed, West Virginia and Pennsylvania, and 233 Crayfish Collection sites, 1956.

Literature records occur for this species at Davis (Blackwater River, Tucker County 6 ♂♂ II, 6 ♀♀, August 2, 1905, Faxon 1914: 131) and Parsons (Shavers Fork, Tucker County, Ortmann 1906: 382).

Cambarus bartoni carinirostris.—This subspecies of *C. bartoni* was first taken by W. P. Hay in Gandy Creek near Osceola, Randolph County, West Virginia, July 12, 1899 (USNM 23962, Paratype MCZ 7399) and at that time was abundant in the main streams of the Tygart and Cheat Rivers, with the Cheat River as its center of distribution (Faxon 1914: 386). Faxon (1914) also lists it taken at Albright (Cheat River, Preston County) by Hay. Ortmann (1931: 139) cites 1 ♂ II, 2 ♀♀ taken on August 2, 1905, in Shavers Fork, Parsons, Tucker County, and noted that those *bartoni* in the Blackwater River at Davis, West Virginia, were typical *C. bartoni* and not *C. b. carinirostris*. The latter is contrary to Dr. Horton H. Hobbs determinations of 1954 wherein he examined these specimens deposited in the U.S.N.M. (see Tucker County records) and has identified the Blackwater River specimens as *C. b. carinirostris*. Faxon (1914: 384-385) describes *carinirostris* and separates it from *C. b. bartoni* as follows:

Rostrum of medium length, very broad, nearly plane or slightly excavated above and with a more or less distinct, median longitudinal carina, acumen short broad with concave sides, its tips strongly upturned. Carapace with a spinulose angle below the eye, branchostegian spine obsolescent; areola of moderate width. Telson bi- or tripinose on each side. Antennae when expanded backward reaching beyond middle

of abdomen. Chelepid stout and heavy, chelae broad and strong, heavily punctate above and below; inner margin of hand obscurely serrato-denticulate; fingers usually gaping at the base, strong down curved, pitted in lines, upper surface heavily ribbed, otherwise like *C. bartoni*.

C. b. carinirostris differs from *C. b. bartoni* in carapace is little more cylindrical rostrum harder and flatter and usually furnished near the tip with a median longitudinal carina. This carina is well defined and extends from near the acumen backward to about the middle of the broad flat surface of the rostrum. It is generally followed by one ill defined and very shallow foveola, sometimes reduced to a low elevation between the lateral angles of the rostrum or wonting.

Thus, the specimens determined as *carinirostris* by Hay and Faxon and checked by Hobbs, on reexamination most do not illustrate a distinct median longitudinal carina. A few specimens, with a little imagination, seem to have the elevated carina followed by the shallow foveola. However, until this subspecies status is examined thoroughly, the determination listed herein as *carinirostris* have been kept, but are not necessarily in agreement with the authors. The above differences or absence of characters suggest that perhaps the subspecies should not be recognized but a matter that will not be settled herein.

Assuming the original identifications are correct *C. b. carinirostris* was previously (1895-1905) collected in the Cheat River watershed. Of the 20 collections currently at the U.S.N.M. comprised of 344 specimens, none were collected from the Pennsylvania portion of the Cheat River watershed. Within West Virginia the following county collections are noted: Pocahontas 3, Preston 1, Randolph 11, Tucker 4, with one collection from the watershed from either Randolph or Pocahontas County. Ninety-seven form I males, 83 form II males, 141 females, 9 immature males, 7 immature females and 46 sex undetermined specimens comprised the samples.

Cambarus carolinus.—*Cambarus carolinus*, a burrowing species (Ortmann 1906: 416; 1931: 149), was not encountered in this survey, however, Ortmann (1931: 147) lists *C. carolinus* captures at Coopers Rock, Mount Chateau, Monongalia County (1 ♀, August 7, 1912) and at Parsons (Cheat River), Tucker County. *C. carolinus* was originally described as *C. carolinus dubius* by W. P. Hay (1902: 38, Type MCZ 23631) from Cranberry Summit (now Terra Alta, Preston County, West Virginia).

Orconectes obscurus.—*Orconectes* (= Faxonius = *Cambarus*) *obscurus* (Hobbs 1942) is reported in the literature from Ices Ferry (present bridge site across Cheat Lake, Monongalia County, West Virginia) by Faxon (1914: 374) and Newcombe (1924: 284). Currently *obscurus* was collected at 34 stations within the watershed. Pennsylvania, Fayette County 4; West Virginia, by counties, Monongalia 2, Preston 6, Randolph 4, Tucker 18. A total of 269 specimens of this species composed of 59 form I males, 76 form II males and 134 females were captured. Generally, this species will be noted to occur in the larger foothill streams. Its absence from the central highly polluted region is likewise obvious. *O. obscurus* is replaced in the smaller tributary or faster flowing streams by *C. b. bartoni* with which it was found at 19 localities.

*List of Localities, Habitat Descriptions and Species Numbers by
Sex or Form of the Crayfish Collections from the Cheat River
Watershed of West Virginia and Pennsylvania*

Pennsylvania, Fayette County

(Temperatures for air and water are expressed in degrees Fahrenheit).

- 437 Big Sandy Creek just W of Elliotttsville, Pa., on Rt. 381, 5-12-56; Bottom boulder, rock and sand; Flow 40 cu ft/sec (abb. cfs below); Temp, air 72, water 72; Depth 4'; Width 40'; Species: *bartoni*, 3 ♂ ♂ I, 2 ♀ ♀.
- 438 Big Sandy Creek 0.9 mi W of Elliotttsville, Pa., 5-12-56; Rock sand bottom; Flow 10 cfs; filamentous algae; Temp, air 62, water 54; Depth 3'; Width 12'; Species: *bartoni*, 7 ♂ ♂ I, 1 ♀; *orconectes*, 1 ♂ I, 2 ♀ ♀ in Berry.
- 439 Mill Cr. 2.0 mi E of Elliotttsville, Pa., 5-12-56; Rock, rubble, sand, algae; Flow 15 cfs; Temp, air 74, water 53; Depth 4'; Width 25'; Species: *bartoni*, 1 ♂ I; *orconectes*, 4 ♂ ♂ I, 2 ♂ ♂ II.
- 440 Laurel Cr. 1.5 mi NW of Elliotttsville, Pa., 1 mi NW of Church, W of Elliotttsville on Mill Run School Road, 5-12-56; Bottom boulder and rock, Temp, air 82, water 54; Depth 2'; Flow 50 cfs; Species: *bartoni*, 3 ♂ ♂ I, 1 ♂ II.

- 441 Mill Cr. at Mill Cr. School 1.5 mi NW of Elliottsville near Laurel Cr. jct., 5-12-56; Rock, rubble, sand; Temp, air 82, water 56; Flow 30 cfs; Depth 2'; Width 25'; Species: *bartoni*, 3 ♂♂ I, 3 ♀♀.
- 444 Big Sandy Cr. $\frac{3}{4}$ mi N of Elliottsville on Rt. 381, 5-20-56; Rock, rubble; Temp, air 72, water 45; Flow 20 cfs; Depth 1'; Width 50'; Species: *bartoni*, 1 ♂ I, 2 ♀♀; *orconectes*, 3 ♂♂ I, 1 ♂ II.
- 445 McIntyre Run at Sandy Cr. School on Scotts Run Road, 5-20-56; Rock, rubble, sand; Filamentous algae; Temp, air 74, water 48; Flow 5 cfs; Depth 5'; Width 10'; Species: *bartoni*, 4 ♂♂ I, 4 ♀♀.
- 446 Braddock Cr. $\frac{3}{4}$ mi W of Chalk Hill and Rt. 40, 5-20-56; Bottom rock, boulder; Filamentous algae; Temp, air 72, water 48; Flow 5 cfs; Depth 1'; Width 5'; Species: *bartoni*, 5 ♂♂ I, 2 ♂♂ II, 3 ♀♀.
- 447 Stony Run $\frac{3}{4}$ mi E of Elliottsville and S of Rt. 381 Elliottsville to Farmington, 5-20-56; Bottom rock, boulder; Filamentous algae; Temp, air 78, water 50; Flow 20 cfs; Depth 2'; Width 30'; Species: *bartoni*, 3 ♂♂ I, 2 ♂♂ II, 6 ♀♀.
- 448 Feik Run, Trib. of Little Sandy Cr. $\frac{1}{4}$ mi N of W. Va. line and 5 forks, 5-20-56; Bottom rock, rubble and sand covered with algae; Temp, air 78, water 49; Flow 30 cfs; Depth 2'; Width 30'; Species: *bartoni*, 2 ♂♂ I, 4 ♀♀.
- 449 Glades Run 1 mi NW of Rt. 26 to Glade Farm, 500' N of Pa.—W. Va. line, 5-20-56; Bottom clay covered with algae; Temp, air 82, water 51; Flow 10 cfs; Depth 2'; Width 10'; Species: *bartoni*, 1 ♂ I, 5 ♀♀.
- 453 Little Sandy Cr. E of Gibbon Glades on Co. Road from Gibbon Glades to Clifton Mills, 5-20-56; Bottom rock, boulder; Temp, air 78, water 52; Flow 30 cfs; Depth 2'; Width 30'; Species: *bartoni*, 11 ♂♂ I, 1 ♂ II.
- 644 Feik Run at Pa.—W. Va. State Line N of Rt. 26 and Glade Farms, 7-18-56; Bottom mud, rock with *Vallisneria*; Temp, air 67, water 59; Flow 5 cfs; Depth 1-2'; Width 10'; Species: *bartoni*, 1 ♂ II.
- 652 Big Sandy Cr. on Pa.—W. Va. State Line, W of Rt. 381 Pa. on W. Va. Co. Rt. 4/2, 7-19-56; Bottom flat rock with long sand stretches; Temp, air 72, water 65; Flow 5 cfs; Depth 2'; Width 60'; Species: *orconectes*, 1 ♀.
- 665* Hope Hollow Cr. Trib. to Cheat R. 1 mi E of Pt. Marion, Pa. bridge, 7-20-56; Bottom rubble highly polluted, color red; Temp, air 75, water 69; Flow 5 cfs; Depth 1'; Width 5'.

West Virginia, Monongalia County

- 663 Coles Run, Trib. to middle backwater Cheat Lake, 7-20-56. Bottom bedrock; Temp, air 79, water 66; Flow 5 cfs; Depth 1'; Width 10'; Species: *bartoni*, 1 ♂ I, 1 ♀; *orconectes*, 2 ♂♂ I, 6 ♂♂ II, 1 ♀.
- 664 Rubles Run, Trib. to Backwater 3 Cheat Lake near Pa.—W. Va. State line 2 mi E Pt. Marion, Pa. on Rt. 71/1, 7-20-56; Bottom bedrock and rubble; Temp, air 87, water 71; Flow 5 cfs; Depth 2'; Width 20'; Species: *orconectes*, 4 ♂♂ I, 2 ♂♂ II, 3 ♀♀.
- 666 Cheat Lake above Quarry Run entry, 3-30-56; Bottom sand; Temp, air 30, water 34; Flow 40 cfs; Depth 20'; Width 20'; Species: *bartoni*, 2 ♂♂ I.

West Virginia, Pocahontas County

- 460 Black Cr. Headwaters of Shavers Fork 1 mi S of Spruce, W. Va., 5-31-56; Bottom rock and boulder; Temp, air 74; water 54; Flow 5 cfs; Depth 2'; Width 10'; Species: *bartoni*, 18 ♂♂ I, 1 ♂ II, 23 ♀♀.
- 461 Shavers Fork S of Black Cr. entry 1 mi S of Spruce, W. Va., 5-31-56; Bottom rock and boulder; Temp, air 74, water 54; Flow 10 cfs; Depth 2'; Width 10'; Species: *bartoni*, 1 ♂ I, 1 ♂ II, 6 ♀♀.
- 462* Shavers Fork 300' N of Black Run 1 mi S of Spruce, W. Va., 5-31-56; Bottom rock, rubble and sand with filamentous algae; Temp, air 74, water 54; Flow 20 cfs; Depth 2'; Width 20'.
- 463 Shavers Fork at Spruce at little dam now falling apart, 5-31-56; Bottom sand, rock and boulder; Temp, air 79, water 56; Flow 25 cfs; Depth 3'; Width 50'; Species: *bartoni*, 7 ♂♂ I, 1 ♂ II, 3 ♀♀.

- 464* Unnamed Trib. enters NW-W into Shavers Fork at Spruce, 5-31-56; Bottom bedrock with algae; Temp, air 79, water 59; Flow 5 cfs; Depth 1'; Width 10'.
- 465 Shavers Fork at R.R. mile post 37 just S of Rocky Cr., 5-31-56; Bottom rock, gravel and sand with algae; Temp, air 74, water 66; Flow 30 cfs; Depth 2'; Width 30'; Species: *bartoni*, 2 ♂ ♂ I, 6 ♀ ♀.
- 466* Second Fork of Shavers Fork RR mile post 35, 5-31-56; Bottom sand; Temp, air 74, water 65; Flow 10 cfs; Depth 2'; Width 20'.
- 467* Shavers Fork between bridge mile post RR 35 and mouth second Fork, 5-31-56; Bottom sand; Temp, air 74, water 65; Flow 5 cfs; Depth 2'; Width 75'.
- USNM 23956 Cheat Bridge, U.S. Fish Comm. acc. 36745, Hay, Faxon, Hobbs determinations, 7-25-99. Species: *carinirostris*, 9 ♂ ♂ I, 5 ♂ ♂ II, 6 ♀ ♀.
- USNM 23971 Cheat Bridge, Faxon det., 7-24-99; Species: *carinirostris*, 3 ♂ ♂ I, 1 ♂ II, 1 ♀ in Berry.
- USNM 28579 A Spring between Durbin and Cheat Bridge 1899; Species: *carinirostris*, 2 ♂ ♂ I.
- USNM 28604 Cheat Bridge, Hay. 7-24-99; Species: *carinirostris*, 1 ♀.

West Virginia, Preston County

- 442 Hazel Run 1 mi NW Hopewell and Rt. 73 to Bruceton Mills, 5-11-56; Bottom sand, rock and mud; Temp, air 80, water 45; Flow 10 cfs; Depth 3'; Width 20'; Species: *bartoni*, 1 ♂ I, 1 ♂ II, 1 ♀.
- 443 Hazel Run on Rt. 73, 2 mi W of Bruceton Mills, $\frac{3}{4}$ mi W of Hopewell, 5-31-56; Bottom rock, sand and mud; Temp, air 80, water 54; Flow 10 cfs; Depth 2-5'; Width 15'; Species: *bartoni*, 2 ♂ ♂ I, 5 ♀ ♀.
- 450 Glade Run $\frac{3}{4}$ mi NW of Rt. 26 and $\frac{3}{4}$ mi NW Shady Grove School, 5-20-56; Bottom rock and boulder; Temp, air 82, water 54; Flow 20 cfs; Depth 2'; Width 10'; Species: *bartoni*, 4 ♀ ♀.
- 451 Trib. to Big Sandy Cr. $\frac{1}{2}$ mi NW of Clifton Mills on Rt. 381 to Elliottsville, 5-20-56; Bottom boulder and rock covered with filamentous algae; Temp, air 80, water 54; Flow 20 cfs; Depth 2'; Width 10'; Species: *bartoni*, 1 ♂ I, 3 ♀ ♀.
- 452* Little Sandy Cr. $1\frac{1}{2}$ mi N of Clifton Mills on Rt. 381 at Bridge 8: 1936; 5-20-56; Bottom boulder, rock, rubble with filamentous algae; Temp, air 78, water 58; Flow 15 cfs; Depth 2'; Width 30'.
- 585 Flag Run at Cool Spring, W. Va., Rt. US 5/50, 2 mi W Macomber, 7-12-56; Bottom boulder and bedrock; Temp, air 56, water 56; Flow 10 cfs; Depth 1'; Width 15'; Species: *bartoni*, 3 ♂ ♂ I, 7 ♀ ♀.
- 586 Trib. to Cheat R. $\frac{3}{4}$ mi E of Macomber on US 50, 7-12-56; Bottom flatrock; Temp, air 59, water 58; Flow 5-10 cfs; Depth $\frac{1}{2}$ '; Width 5'; Species: *bartoni*, 1 ♂ I, 1 ♀.
- 587* Buffalo Cr. Rt. US 50 at Macomber, 7-12-56; Bottom boulder and flatrock; Temp, air 65, water 61; Flow 10 cfs; Depth 1'; Width 15'.
- 588 Buffalo Cr. 1.5 mi SW Macomber on W. Va. 72, 7-12-56; Bottom bedrock; Temp, air 70, water 65; Flow 10 cfs; Depth 1'; Width 15'; Species: *bartoni*, 2 ♂ ♂ I, 4 ♀ ♀; *orconectes*, 1 ♀.
- 589 Buffalo Cr. at Etam on Co. Rt. 61, W. Va. 72, 7-12-56; Bottom bedrock; Temp, air 75, water 65; Flow 10 cfs; Depth 1'; Width 20'; Species: *bartoni*, 4 ♂ ♂ I, 1 ♀; *orconectes*, 1 ♀.
- 590 Buffalo Cr. above entry of Little Buffalo $\frac{3}{4}$ mi near Bucklick Run, 7-12-56; Bottom rubble; Temp, air 72, water 66; Flow 5 cfs; Depth $\frac{1}{2}$ '; Width 5'; Species: *bartoni*, 3 ♂ ♂ I, 5 ♀ ♀.
- 596* Cheat R. at Tucker-Preston Co. line Rt. 27/1, 7-13-56; Bottom rubble and sand with many *Dianthera* islands in it; Temp, air 66, water 69; Flow 30 cfs; Depth 2'; Width 250-300'.
- 597 Little Wolf Cr. S. of US 50 on Rt. Co. 110, $\frac{1}{2}$ mi on Hardesty-Sell Rd., 7-13-56; Bottom bedrock, boulder; Temp, air 68, water 60; Flow 15 cfs; Depth 1'; Width 15'; Species: *bartoni*, 3 ♂ ♂ I, 5 ♀ ♀.
- 598 Wolf Cr. on Rt. US 50 at Hardesty, 7-13-56; Bottom bedrock and boulder; Temp, air 67, water 60; Flow 10 cfs; Depth 1'; Width 10'; Species: *bartoni*, 4 ♀ ♀.
- 599* Cheat R. on Rt. US 50, $\frac{1}{2}$ mi NW of Erwin, 7-13-56; Bottom boulder, rubble and sand; Temp, air 68, water 69; Flow 30 cfs; Depth 3'; Width 300'.

- 600 Madison Run on US 50, $\frac{3}{4}$ mi NW of Erwin, 7-13-56; Bottom bedrock and boulders covered with algae; Temp, air 75, water 61; Flow 10 cfs; Depth 1'; Width 10'; Species: *bartoni*, 2 ♂♂ I, 5 ♀♀.
- 601* Pringle Run 1 mi S of La Rue on W side of Cheat River & Rt. 72, 7-13-56; Bottom bedrock and boulders; Temp, air 72, water 60; Flow 25 cfs; Depth 1'; Width 20'; heavy mine pollution.
- 602* Licking Run at LaRue, W. Va., 3 mi S of Kingwood on Rt. 72, 7-13-56; Bottom bedrock and boulder; Temp, air 72, water 60; red colored from heavy acid mine pollution; Flow 20 cfs; Depth 1'; Width 5'.
- 603* Morgan Run 1.2 mi SE of Kingwood on Rt. 72 to Cadell (2 mi S of Rts. 72 & 7 jct.), 7-13-56; Bottom rock and sludge; Temp, air 72, water 65; Polluted by mines and sewage; Flow 15 cfs; Depth 1'; Width 20'.
- 604* Morgan Run $\frac{3}{4}$ mi NW Snider and Rt. 26, 7-13-56; Bottom boulder; Temp, air 72, water 65; Red from mine pollution; Flow 5 cfs; Depth 1'; Width 10'.
- 605* Trib. of Morgan Run at Irona $\frac{1}{2}$ mi NW of Rt. 26, 7-13-56; Bottom boulder; Temp, air 75, water 66; Red with mine pollution; Flow 10 cfs; Depth 1'; Width 10'.
- 606* Pringle Run headwaters at Tunnelton on Rt. 26, 7-13-56; Bottom boulder; Temp, air 76, water 66; Heavy mine pollution; Flow 5 cfs; Width 1'; Depth 2'.
- 607* Cheat R. at Rowlesburg below Saltlick Cr. entry and Rt. 51, 7-14-56; Bottom rock and rubble; Temp, air 73, water 67; Covered with algae and sludge; Flow 30 cfs; Depth 2'; Width 320'.
- 608 Saltlick Run 1 mi NE Rowlesburg near B&O Roundhouse at Rt. 51 crossing, 7-14-56; Bottom flat slippery rock, boulder, gravel; Temp, air 67, water 69; Flow 15 cfs; Depth 2'; width 15-20'; Species: *bartoni*, 4 ♂♂ I, 1 ♀.
- 609 Big Run approx. 2 mi NE Rowlesburg, a Saltlick Trib. on Co. Rt. 51, 7-14-56; Bottom bedrock, rubble; Temp, air 73, water 63; Flow 15 cfs; Depth 1'; Width 10'; Species: *bartoni*, 3 ♂♂ I, 2 ♀♀.
- 610 Spruce Run at Amblersburg RR Tunnel on Co. Rt. 51, 7-14-56; Bottom bedrock, boulder; Temp, air 65, water 65; Flow 10 cfs; Depth 3'; Width 10'; Species: *bartoni*, 5 ♂♂ I, 6 ♀♀.
- 611 Saltlick Run near Pine Grove School on Co. Rt. 51, 7-14-56; Bottom rock, rubble; Temp, air 72, water 67; Flow 15 cfs; Depth 2'; Width 15'; Species: *bartoni*, 3 ♂♂ I, 2 ♀♀.
- 612 Kinsinger Run 1 mi S Beatty School Co. Rt. 80, 7-14-56; Bottom rock, rubble, mud; Temp, air 68, water 66; Flow 10 cfs; Depth 2'; Width 8'; Species: *bartoni*, 4 ♀♀.
- 613 Saltlick Run at Beatty School Co. Rt. 51/4, 7-14-56; Bottom rubble; Temp, air 72, water 65; Flow 10 cfs; Depth 3'; Width 15'; Species: *bartoni*, 3 ♂♂ I, 2 ♀♀.
- 614 Saltlick Run 3 mi SW Terra Alta on Amblersburg Rt. 51, 7-14-56; Bottom rubble; Temp, air 68, water 65; Flow 5 cfs; Depth $\frac{1}{2}$ '; Width 8'; Species: *bartoni*, 6 ♂♂ I, 2 ♀♀.
- 615* Mountain Run, Trib. of Spruce Run 1.5 mi SW Rodamer, 7-15-56; Bottom clay, rubble; Temp, air 70, water 63; Flow 5 cfs; Depth 2'; Width 5'.
- 616 Spruce Run 1.3 mi SW Rodamer near Mountain Run, 7-15-56; Bottom flatrock, rubble; Temp, air 70, water 62; Flow 5 cfs; Depth 1'; Width 8'; Species: *bartoni*, 2 ♂♂ I, 1 ♀.
- 617* Stamping Ground Run S of Whitsell School, 7-15-56; Bottom sand, rubble; Temp, air 76, water 59; Flow 5 cfs; Depth 1'; Width 5'.
- 618* Joes Run $\frac{3}{4}$ mi W Whitsell School, 7-15-56; Bottom rubble and sand; Temp, air 77, water 66; Flow 10 cfs; Depth 1'; Width 10'; Active mines below this point.
- 619* Buffalo Cr. 1.5 mi SE of Rt. 7 and E of Kingwood Country Club, 7-15-56; Bottom rubble; Temp, air 77, water 65; Flow 10 cfs; Depth 1'; Width 5'; Strip mines below this point.
- 620* Buffalo Cr. 500' below Spillway to Dam on Kingwood Country Club Golf Course, 7-15-56; Bottom rubble; Temp, air 81, water 74; Flow 10 cfs; Depth $\frac{1}{2}$ '; Width 10'; Sponge and algae growing.
- 621 Elsey Cr. 1 mi N Rt. 7/12, 2 mi S of Albright, 7-15-56; Bottom boulders; Temp, air 85, water 67; Flow 30 cfs; Depth 1'; Width 10'; Species: *bartoni*, 1 ♂ I.
- 622* Daugherty Run at S city limit of Albright, 7-15-56; Bottom rock and sludge; Temp, air 74, water 67; Green colored from runoff and ash pile; Flow 10 cfs; Depth 1'; Width 10'.
- 623 "Upper" Daugherty Cr. near Crane School on Co. Rt. 3/12, 7-15-56; Bottom boulder; Temp, air 75, water 60; Flow 20 cfs; Depth 1'; Width 20'; Species: *bartoni*, 1 ♂ I, 1 ♀.

- 624 Roaring Cr. at Lick Run School on Rt. 3, Brandonville Turnpike, 7-15-56; Bottom rock and Boulder; Temp, air 58, water 61; Flow 10 cfs; Depth 1'; Width 15'; Species: *bartoni*, 3 ♂♂ I, 5 ♀♀.
- 625 Daugherty Run at Dority on Brandonville Pike 7-15-56; Bottom rock rubble; Temp air 75, water 61; Flow 10 cfs; Depth 1'; Width 10'; Species: *bartoni*, 3 ♂♂ I, 1 ♀.
- 626* Roaring Run at Ruth Belle Mills, Rt. 26, 7-16-56; Bottom sludge, rock; Temp, air 70, water 63; Flow 15 cfs; Depth 1'; Width 20'; Water white colored from ash pile runoff.
- 627 Roaring Run 1 mi SW Lick Run School Co. Rt. 3/9, 7-16-56; Bottom boulder, moss; Temp, air 70, water 58; Flow 30 cfs; Depth 2'; Width 15'; Species: *bartoni*, 1 ♂ I, 1 ♀.
- 628 Lick Run near Lick Run School Rt. 3, 7-16-56; Bottom rock, rubble; Temp, air 72, water 60; Flow 15-20 cfs; Depth 2'; Width 10'; Species: *bartoni*, 13 ♂♂ I, 2 ♀♀.
- 629 Headwaters of Muddy Cr. 1 mi N near Piney Swamp Knob Co. Rt. 28, 7-16-56; Bottom bedrock; rubble; Temp, air 76, water 63; Flow 5 cfs; Depth 2'; Width 10'; Species: *bartoni*, 3 ♂♂ I, 2 ♀♀.
- 630* Muddy Cr. 1.5 mi SE X E of Cuzzart, 7-16-56; Bottom boulder and bedrock and moss; Temp, air 72, water 60; Flow 25 cfs; Depth 1'; Width 10'.
- 631 Muddy Cr. 1 mi SE of Cuzzart on Co. Rt. 28, 7-16-56; Bottom boulder and moss; Temp, air 75, water 61; Flow 30 cfs; Depth 1'; Width 10'; Species: *bartoni*, 2 ♀♀.
- 632 Muddy Cr. 1 mi S Centenary Church, 7-16-56; Bottom boulder and flatrock; Temp, air 80, water 65; Flow 20 cfs; Depth 1'; Width 15-20'; Species: *bartoni*, 4 ♂♂ I.
- 633 Muddy Cr. 1 mi SW of Guzman on Co. Rt. 17, 7-16-56; Bottom bedrock and rock with algae; Temp, air 83, water 67; Flow 15 cfs; Depth 1'; Width 30'; Species: *bartoni*, 1 ♂ II.
- 634* Glade Run $\frac{3}{4}$ mi W Glade Meadow School and Rt. 26, 7-16-56; Bottom mud; Temp, air 75, water 72; Extreme mine pollution; Flow 1-5 cfs; Depth 1'; Width 5'.
- 635* Glade Run near Martin Cr. $\frac{3}{4}$ mi NW Rt. 26 and Deep Hollow School, 7-16-56; Bottom boulder; Temp, air 75, water 72; Red mine pollution; Flow 10 cfs; Depth 1'; Width 10'.
- 636* Martin Run 0.4 mi NW Rt. 26 and Deep Hollow School, 7-16-56; Bottom boulder; Temp, air 75, water 72; Red from deep and strip mine pollution; Flow 10 cfs; Depth 1'; Width 15'.
- 637* Muddy Cr. $\frac{1}{2}$ mi S of Rt. 26 and Martin and Muddy Cr. jet., 7-16-56; Bottom boulder and mud; Temp, air 75, water 69; Red from mine pollution; Flow 20 cfs; Depth 2'; Width 20'.
- 638* Muddy Cr. $\frac{1}{2}$ mi N of Ruth Belle Mill and 2 mi NW Rt. 26, 7-16-56; Bottom boulder and rock; Temp, air 75, water 71; Red from pollution; Flow 15 cfs; Depth 2'; Width 25'.
- 639 Beaver Cr. Headwaters $\frac{1}{2}$ mi SW Mountain Dale and Rt. 11, 7-17-56; Bottom boulder, sand and moss; Temp, air 61, water 63; Flow 10 cfs; Depth 1'; Width 10'; Species: *bartoni*, 5 ♂♂ I, 2 ♂♂ II, 4 ♀♀.
- 640 Beaver Cr. Trib. of Little Sandy Cr. 0.5, 5 mi NW Cuzzart Rt. 5/10, 7-17-56; Bottom boulder and sand; Temp air 61, water 63; Red colored; Flow 10 cfs; Depth 1'; Width 10'; Species: *bartoni* 3 ♂♂ I.
- 641 Beaver Cr. at Bridge 2 on Co. Rt. 3/4, 1 mi NNW of Vale School, 7-17-56; Bottom boulder and sand; Temp, air 61, water 66; Flow 10 cfs; Depth 1'; Width 15'; Species: *bartoni*, 2 ♂♂ I, 2 ♂♂ II.
- 642 Little Sandy Cr. at Rt 26 Bridge 2 mi S of Bruceton Mills, 7-17-56; Bottom flatrocks; Temp, air 63, water 73; Flow 0-5 cfs; Depth 1'; Width 60'; Species: *bartoni*, 1 ♂ I, 3 ♀♀; *orconectes*, 4 ♀♀.
- 643 Headwaters of Hog Run 1 mi SSE of Clover School on Co. Rt. 26/9, 7-17-56; Bottom sand and rock; Temp, air 67, water 63; Flow 5 cfs; Depth 1'; Width 5'; Species: *bartoni*, 1 ♂ I, 1 ♀.
- 645* Cherry Run 0.3 mi E of Glade Farm near Spingeon School 7-18-56; Bottom mud; Temp, air 75, water 69; Flow 5 cfs; Depth 1'; Width 5'.
- 646* Mill Run at Hazelton—Saw Mill Rt. 12, 7-18-56; Bottom mud, bedrock and boulders and moss; Temp, air 79, water 61; Flow 0-5 cfs; Depth 2'; Width 10'.
- 647* Hog Run near entry with Little Sandy Cr. 1 mi NW Hazelton Co. Rt. 5/7, 7-18-56; Bottom mud with *Vallisneria*; Temp, air 76, water 65; Flow 5 cfs; Depth 3'; Width 20'; Strip mines all around.
- 648 Little Sandy Cr. 1.5 mi E of Rt. 26 on Co. Rt. 3, 1.5 mi NW of Vale School, 7-18-56; Bottom

- boulder and some sand; Temp., air 72, water 75; Flow 20 cfs; Depth 3'; Width 40'; Species: *bartoni*, 1 ♀; *orconectes*, 1 ♂ II.
- 649* Little Sandy Cr. approx. 2 mi N of Vale School 7-18-56; Bottom boulder; Temp, air 72, water 73; Flow 20 cfs; Depth 2'; Width 15'.
- 650* Little Sandy Cr. 2 mi NNE of Locust Grove School on Co. Rt. 5/13, 7-18-56; Bottom boulder, mud; Temp, air 80, water 75; Flow 10 cfs; Depth 3'; Width 20'.
- 651 Clifton Mills—Big Sandy Cr. Co. Rt. 8, 7-19-56; Bottom rock and sand; Temp, air 72, water 65; Flow 10 cfs; Depth 3'; Width 60'; Species: *orconectes*, 3 ♂♂ II, 1 ♀.
- 653 Headwaters of Laurel Cr. 1 mi E Valley School on Co. Rt. 2/1, 7-19-56; Bottom mud and rock; Temp, air 77, water 64; Flow 10 cfs; Depth 2'; Width 10'; Species: *bartoni*, 1 ♂ II.
- 654* Patterson Run Lake at Valley School Lake, 7-19-56; Bottom rock and mud with cattails at one end; Temp, air 75, water 69; Flow 5 cfs; Depth 15'+; Width 40'.
- 655 Laurel Cr. upstream from Greenville School, 7-19-56; Bottom mud; Temp, air 71, water 63; Flow 5 cfs; Depth 3'; Width 10'; Species: *bartoni*, 1 ♀.
- 656 Big Sandy Cr. at Bruceton Mills Dam, 7-19-56; Bottom bedrock and rock with *Vallisneria*; Temp, air 73, water 65; Flow 15 cfs; Depth 4'; Width 60'; Species: *orconectes*, 1 ♂ II, 2 ♀♀.
- 657 Laurel Run at Rt. 73, 5 mi W of Bruceton Mills, 7-19-56; Bottom boulder, rock; Temp, air 61, water 63; Flow 5 cfs; Depth 1'; Width 30'; Species: *bartoni*, 13 ♂♂ I, 1 ♂ II, 6 ♀♀.
- 658 Big Sandy Cr. at Rockville on Co. Rt. 14/1, 7-19-56; Bottom bedrock and huge boulders; Temp, air 70, water 73; Flow 30 cfs; Depth 2'; Width 125'; Species: *bartoni*, 1 ♀.
- 659* Trib. to SE of Big Sandy Cr. near Rockville at Waterfall, 7-19-56; Bottom bedrock outcrop; Temp, air 72, water 65; Flow 10 cfs; Depth 4'; Width 20';
- 660* Bull Run at Bull Run, 7-19-56; Bottom boulder and slimy algae; Temp, air 72, water 63; Red from mine waste; Flow 15 cfs; Depth 2'; Width 20'.
- 661* Cheat R. at Albright Dam and Rt. 26 Bridge, 7-20-56; Bottom boulder, mud; Temp, air 76 water 73; Flow 50 cfs; Depth 3'; Width 200'.
- 662* Cheat R. at Rt. 72, 2 mi W of Kingwood, 7-20-56; Bottom rubble rock with algae and *Dianthera*; Temp, air 70, water 70; Flow 40 cfs; Depth 2'; Width 400'.
- USNM 28602 Muddy Cr. near Albright. H. Hay, 7-17-99; Species: *carinirostris*, 1 ♂ I.

West Virginia, Randolph County

- 454 Red Run 1 mi NW Cheat Bridge along Rt. US 250, 5-30-56; Bottom sand, tree branches, some algae; Temp, air 56, water 50; Flow 5 cfs; Depth 3'; Width 15'; Species: *bartoni*, 2 ♂♂ I, 4 ♀♀.
- 455 Cheat Bridge—Shavers Fork at US 250, 5-30-56; Bottom rock, boulder and sand; Temp, air 72, water 53; Flow 36 cfs; Depth 3'; Width 60'; Species: *bartoni*, 4 ♂♂ I, 2 ♂♂ II, 17 ♀♀.
- 456 Shavers Fork at mouth of Whitmeadow Run 1 mi N Cheat Bridge on USFS Rt. 47, 5-30-56; Bottom rock, boulders and some sand and *Dianthera*; Temp, air 74, water 55; Flow 40 cfs; Depth 4'; Width 60'; Species: *bartoni*, 2 ♂♂ I, 1 ♀.
- 457* Trib., no name between Stonecoal and Whitmeadow Cr. near Rt. 49, 5-30-56; Bottom rock, boulder; Temp, air 74, water 55; Flow 40 cfs; Depth 1'; Width 10'.
- 458 Stonecoal Cr. 500' up from mouth jct with Shavers Fork, 5-30-56; Bottom bedrock of coal seam and boulders; Temp, air 74, water 55; Flow 20 cfs; Depth 1'; Width 20'; Species: *bartoni*, 5 ♂♂ I, 1 ♀.
- 459 Blister Run ½ mi E of Cheat Bridge along US 250, 5-30-56; Bottom rock and boulder; Temp, air 75, water 55; Flow 5 cfs; Depth 1'; Width 10'; Species: *bartoni*, 7 ♂♂ I, 3 ♀♀.
- 468 First Fork near entrance to Shavers Fork, 6-1-56; Bottom sand; Temp, air 55; water 51; Flow 30 cfs; Depth 2'; Width 30'; Species: *bartoni*, 6 ♂♂ I, 1 ♂ II, 5 ♀♀.
- 469 Shavers Fork N of first fork and S of Cheat Bridge, 6-1-56; Bottom rocky, boulder and sand; Temp, air 55, water 50; Flow 40 cfs; Depth 3'; Width 100'; Species: *bartoni*, 4 ♂♂ I, 1 ♀.
- 470* Fish Hatchery Cr. 1½ mi S of Cheat Bridge, 6-1-56; Bottom boulders and rock; Temp, air 56, water 50; Flow 40 cfs; Depth 2'; Width 15'; Water brown from rhododendron.
- 471 Whitmeadow Cr. on USFS Rt. 47 N of Cheat Bridge, 6-2-56; Bottom rock and boulder; Temp, air 45, water 48; Flow 40 cfs; Depth 1'; Width 15'; Species: *bartoni*, 7 ♂♂ I, 5 ♀♀.

- 472 Fishing Hawk Cr. at Bemis, 6-6-56; Bottom boulder and gravel; Temp, air 56, water 48; Flow 15 cfs; Depth 1'; Width 15'; Species: *bartoni*, 1 ♀.
- 473 Gladly Fork 0.4 mi N of Gladly on Co. Rt. 27, 6-6-56; Bottom rock and rubble; Temp, air 60, water 50; Flow 10 cfs; Depth 3'; Width 20'; Species: *bartoni*, 8 ♂♂ I, 5 ♀♀.
- 474 West Fork Gladly Cr. 2.7 mi S of Gladly near Beulah Co. Rt. 22/2, 6-6-56; Bottom rubble; Temp, air 64, water 50; Flow 5 cfs; Depth 1'; Width 10'; Species: *bartoni*, 5 ♂♂ I, 2 ♂♂ II, 7 ♀♀.
- 475 Louk Run near confluence with East fork Gladly Cr. 2.8 mi SE Gladly Rt. 1, 6-9-56; Bottom rubble and sand; Temp, air 73, water 53; Flow 5 cfs; Depth 1/2'; Width 10'; Species: *bartoni*, 1 ♂ I, 1 ♀.
- 476 East fork Gladly Fork 2.8 mi SE Gladly on Co. Rt. 22/1, 6-6-56; Bottom rock, rubble and *Dianthera*; Temp, air 70, water 65; Flow 20 cfs; Depth 4'; Width 20'; Species: *bartoni*, 7 ♂♂ I, 2 ♂♂ II, 8 ♀♀.
- 477* Elk Run 5 mi S of turn off to forest station on Rt. 14 walk down Chuffy Trail near Rt. USFS 35, 6-6-56; Bottom rock and rubble; Temp, air 80, water 50; Flow 5 cfs; Depth 1/2'; Width 10'.
- 478 Laurel fork down Chuffy Trail N of Elk Run, 5 mi S of Forest Sta. E of USFS Rt. 14, 6-6-56; Bottom rock and rubble; Temp, air 80, water 50; Flow 5 cfs; Depth —; Width 10'; Species: *bartoni*, 6 ♀♀.
- 479* 5 Lick Run 1/2 mi E of Forest station where road crosses creek Co. Rt. 40, 6-6-56; Bottom rubble; Temp, air 68, water 59; Flow 10 cfs; Depth 1'; Width 15'.
- 480 Laurel Fork at Cherry Grove U.S. Forest Station on Co. Rt. 40, 6-7-56; Bottom rock, rubble and algae; Temp, air 61, water 52; Flow 30 cfs; Depth 3'; Width 20'; Species: *bartoni*, 10 ♂♂ I, 5 ♂♂ II, 23 ♀♀.
- 481 Gandy Cr. 500' S of opening for Sinks of Gandy near Co. Rt. 40, 6-7-56; Bottom rubble Temp, air 78, water 53; Flow 15 cfs; Depth 2'; Width 20'; Species: *bartoni*, 3 ♂♂ I, 3 ♀♀.
- 482* Outlet of Sinks of Gandy, 6-7-56; Bottom sand, muck and rock; Temp, air 77, water 54; Flow 10 cfs; Depth 3'; Width 20'.
- 483 Gandy Cr. S of Grants Run 10 mi S of Whitmer on Co. Rt. 41, 6-7-56; Bottom rock, boulder and filamentous algae; Temp, air 80; water 60; Flow 30 cfs; Depth 3'; Width 40'; Species: *bartoni*, 2 ♂♂ I, 3 ♀♀.
- 484 Gandy Cr. 5 mi S of Whitmer Co. Rt. 41, 6-7-56; Bottom bedrock, boulder; Temp, air 74, water 64; Flow 40 cfs; Depth 3'; Width 40'; Species: *bartoni*, 7 ♂♂ I, 12 ♀♀.
- 485 Gandy Cr. 1 mi NW of Whitmer, 6-7-56; Bottom boulder, rocks and filamentous algae; Temp, air 74, water 66; Flow 30 cfs; Depth 3'; Width 75'; Species: *bartoni*, 1 ♂ II, 13 ♀♀.
- 486 Dry Fork 3/4 mi S of junction with Gandy Cr. near Whitmer Co. Rt. 29, 6-8-56; Bottom rubble; Temp, air 56, water 52; Flow 5 cfs; Depth 1/2'; Width 10'; Species: *bartoni*, 1 ♂ I, 1 ♀.
- 487 Dry Fork at Job. Rt. 29 below Stinking Cr., 6-8-56; Bottom rock and rubble; Temp, air 60, water 53; Flow 30 cfs; Depth 1'; Width 40'; Species: *bartoni*, 5 ♂♂ I, 9 ♀♀.
- 488 Dry Fork 1 mi W of Harmon on US 33/4, 6-8-56; Bottom boulder and rock; Temp, air 68, water 54; Flow 50 cfs; Depth 3'; Width 75'; Species: *bartoni*, 2 ♂♂ I, 10 ♀♀.
- 489* Horsecamp Run at Harman on US 33/32, 6-8-56; Bottom rock and boulder; Temp, air 66, water 55; Flow 5 cfs; Depth 1'; Width 10-15'.
- 490 Laurel Cr. below Wymer on Rt. US 33/4, 6-8-56; Bottom bedrock and boulder; Temp, air 80, water 62; Flow 15 cfs; Depth 3'; Width 75'; Species: *bartoni*, 2 ♂♂ I, 5 ♀♀.
- 491 Beaver Dam Run 5.2 mi S of Wymer and US 33/4 on Co. Rt. 27, 6-8-56; Bottom rubble, sand and algae; Temp, air 80, water 66; Flow 5 cfs; Depth 3'; Width 10'; Species: *bartoni*, 5 ♂♂ I, 5 ♀♀.
- 492 Laurel Run N of Beaver Dam Run entry (no road) 5.1 mi S of Wymer and 1 mi E of Co. Rt. 27, 6-8-56; Bottom rock and rubble; Temp, air 80, water 64; Flow 10 cfs; Depth 3'; Width 40'; Species: *bartoni*, 2 ♂♂ I, 2 ♀♀.
- 493 Laurel Fork 10 mi S of Wymer on Co. Rt. 27, 6-9-56; Bottom rock rubble mud and algae; Temp, air 60, water 57; Flow 20 cfs; Depth 3'; Width 40'; Species: *bartoni*, 6 ♂♂ I, 2 ♂♂ II, 5 ♀♀.

- 494 Gladly Fork 4 mi S of Rt. 33 near McCray Run and Co. Rt. 27, 6-9-56; Bottom rock, rubble and algae; Temp, air 80, water 64; Flow 20 cfs; Depth 2'; Width 40'; Species: *bartoni*, 1 ♂ I, 2 ♀ ♀.
- 495 Gladly Fork 1 mi E Evinwood Rt. 33, 6-9-56; Rock, rubble and mud; Temp, air 80, water 67; Flow 20 cfs; Depth 2'; Width 40'; Species: *bartoni*, 2 ♂ ♂ I, 2 ♂ ♂ II.
- 496* Taylor Run on US 30 W of Wymer and Chestnut Grove, 6-10-56; Bottom boulder; Temp, air 54, water 75; Flow 5 cfs; Depth —; Width 15'.
- 497* Shavers Fork 1 mi W of Bowden on US 33/4, 6-10-56; Bottom rock, rubble and algae; Temp, air ?, water 54; Flow 5 cfs; Depth 3'; Width 90'.
- 498* Yellow Cr. 1 mi N of Forest Service Road 93 N of Rt. (US) 33 and Alpena, 6-10-56; Bottom conglomerate pebbles, sand and *selaginella*; Temp, air 74, water 57; Colored yellow; Flow 5 cfs; Depth 3'; Width 10'.
- 499* Otter Cr. N of Yellow Cr. entry 1 mi S of Forest Rd. 93 and Alpena, 6-10-56; Bottom sand; Temp, air 75, water 57; Flow 10 cfs; Depth 1'; Width 20'.
- 500 Condon Run Headwaters to Otter Cr. at end of Forest Rd. 93 1 mi S of US 33, 6-10-56; Bottom rubble and sand; Temp, air 75, water 57; Flow 5 cfs; Depth 1'; Width 10'; Species: *bartoni*, 1 ♂ I, 7 ♀ ♀.
- 503 Gladly Fork at entrance of Panther Camp Run, 2 mi W of Sully on Co. Rt. 12, 6-12-56; Bottom rock and algae; Temp, air 73, water 67; Flow 15 cfs; Depth 5'; Width 60'; Species: *bartoni*, 3 ♂ ♂ I, 2 ♂ ♂ II, 3 ♀ ♀.
- 504 Gladly Fork near Kuntsville approx. 5 mi NW of Sully and N of Co. Rt. 12, 6-12-56; Bottom rock, rubble, bedrock, *Chara* and *Vallisneria*; Temp, air 73, water 73; Flow 25 cfs; Depth 5'; Width 100'; Species: *bartoni*, 1 ♂ I.
- 505 Three Spring Run, Trib. to Gladly Fork near Sully (approx. 3 mi) on Co. Rt. 27, 6-12-56; Bottom rubble; Temp, air 75, water 55; Flow 5 cfs; Depth 1'; Width 10'; Species: *bartoni*, 3 ♂ ♂ I, 4 ♀ ♀.
- 506 Dry Fork 2 mi NE of Harmon off Rt. 32 first bridge N of Town, 6-12-56; Bottom rock and rubble; Temp, air 74, water 70; Flow 10 cfs; Depth 1'; Width 80'; Species: *bartoni*, 1 ♂ I, 3 ♀ ♀.
- 507 Red Cr. on Rt. 32 at Tucker—Randolph Co. Line, 6-14-56; Bottom boulder; Temp, air 75, water 71; Flow 10 cfs; Depth 2'; Width 80'; Species: *bartoni*, 2 ♂ ♂ I, 1 ♀.
- 508 Dry Fork at Dry Fork 3 mi NW of Co. Rt. 32/7, 6-13-56; Bottom rock, boulders, sand and *chara* in pools; Temp, air 59, water 62; Flow 15 cfs; Depth 3'; Width 60'; Species: *orconectes*, 1 ♀.
- 547 Shavers Fork near Bowden on Rt. 33/4 W of National Forest Entrance, 6-30-56; Bottom rock and boulder; Temp, air 70, water 68; Flow 30 cfs; Depth 4'; Width 200'; Species: *bartoni*, 5 ♂ ♂ I, 1 ♀; *orconectes*, 19 ♂ ♂ II, 23 ♀ ♀.
- 548 Shavers Fork ¾ mi NE of Turkey Knob ridge S of USFS 38/9/3, 7-1-56; Bottom rock, rubble and algae; Temp, air 71, water 68; Flow 40 cfs; Depth 3'; Width 200'; Species: *bartoni*, 2 ♂ ♂ II; *orconectes*, 1 ♂ II, 3 ♀ ♀.
- 549* Shavers Fork near Canfield School on USFS Rt. 38, 7-1-56; Bottom rock, boulder, rubble, algae; Temp, air 73, water 68; Flow 30 cfs; Depth 2'; Width 125'; A mud-sand oxbow nearby.
- 550 Rattlesnake Run on USFS Rt. 38, 5 mi N of Rt. 33/4 to Elkins, 7-1-56; Bottom bedrock, boulders, algae; Temp, air 72, water 64; Flow 15 cfs; Depth 1'; Width 15'; Species: *bartoni*, 3 ♂ ♂ I, 13 ♀ ♀.
- 551 Little Black Fork at USFS jct 38-7 Rt., 7-1-56; Bottom bedrock-rock, algae; Temp, air 78, water 63; Flow 15 cfs; Depth 1'; Width 15'; Species: *bartoni*, 3 ♂ ♂ I, 2 ♀ ♀; *orconectes*, 1 ♀.
- 552 Shavers Fork below Clifton Run and USFS Rt. 39, 7-2-56; Bottom bedrock, boulder; Temp, air 71, water 70; Flow 40 cfs; Depth 2'; Width 120'; Species: *bartoni*, 1 ♂ I.
- USNM 23693 Gandy Cr. at Osceola, Hay collector. Species: *carinirostris*, 7 ♂ ♂ I, 1 ♂ II, 4 ♀ ♀.
- USNM 23958 Cheat R. near the pike, Faxon determined, 7-25-99; Species: *carinirostris*, 25 specimens.

- USNM 23961 West Fork Gladly Cr., 7-10-99, Hobbs determined; Species: *carinirostris*, 8 ♂♂ I, 6 ♀♀.
- USNM 23962 (Type specimen) Gandy Cr. at Osceola, W. P. Hay determined; U.S. Fish Comm., 7-12-99; Species: Type *carinirostris*, 1 ♂ I, 2 ♂♂ II, 17 ♀♀.
- USNM 23963 Gandy Cr. at Osceola, Hobbs determined 1954, 7-12-99; Species: *carinirostris*, 20 specimens.
- USNM 23973 Gladly Fork at Seneca Rt. crossing. Hobbs determined 1954, 9-1-99; Species: *carinirostris*, 4 ♂♂ I, 2 ♂♂ II, 6 ♀♀.
- USNM 23974 Laurel Fork of Cheat R. near Seneca R. crossing. Faxon determined, 7-31-99; Species: *carinirostris*, 1 specimen.
- USNM 23981 Cheat R. at Raines (Jenningsston now) listed as *C. b. bartoni* 9-2-99; changed by H. Hobbs 1-31-54; Species: *carinirostris*, 2 ♂♂ II, 2 ♂♂ imm., 3 ♀♀ imm.
- USNM 28606 Cheat R. near Pike Hwy, Faxon determined 7-25-99; H. Hobbs changed 1954; Species: *carinirostris*, 2 ♂♂ I, 1 ♀.
- USNM 28608 E. Fork Gladly Cr. 7-10-99 checked by Hobbs 1954; Species: *carinirostris*, 5 ♂♂ I, 7 ♀♀.
- USNM 88495 Three spring run Trib. to Gladly Fork and Cheat R., 7-16-34, E. P. Creaser, Acc. 130968; Species: *carinirostris*, 3 ♂♂ II, 1 ♀.

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- 501 Dry Fork 1.2 mi N of Jenningsston Co. Rt. 35/15, 6-12-56; Bottom bedrock, boulders, pools of sand, algae; Temp, air 66, water 65; Flow 25 cfs; Depth 4'; Width 120'; Species: *bartoni*, 1 ♀; *orconectes*, 1 ♂ II, 4 ♀♀.
- 502* Dry Fork 1 mi NW Jenningsston Rt. 35/15, 6-12-56; Bottom bedrock, sand and algae; Temp, air 65, water 58; Flow 25 cfs; Depth 6'; Width 120'.
- 509* Red Creek E of Laneville on USFS Rt. 19, 6-13-56; Bottom boulder; Temp, air 80, water 62; Flow 30 cfs; Depth 2'; Width 15'.
- 510 Mill Creek 1 mi W of Rt. 32, less than 1 mi W Cosner School on Co. Rt. 35, 6-13-56; Bottom mud and *chara*; Temp, air 82, water 70; Flow 5 cfs; Depth 3'; Width 10'; Species: *orconectes*, 21 ♂♂ I, 4 ♀♀ in Berry.
- 766 Mill Creek 1 mi W Cosner School 10 mi S of Davis, 10-14-56; Bottom mud and *chara*; Temp, air 65, water 60; Flow 0 cfs; Depth 3'; Width 10'; Species: *orconectes*, 3 ♀♀.
- 511 Blackwater R. on Rt. 32, 10 mi S Davis, 1.7 mi N of Cosner School, 6-13-56; Bottom mud, clay and *Vallisneria*; Temp, air 69, water 71; Flow 5 cfs; Depth 5'; Width 15'; Species: *orconectes*, 15 ♂♂ I.
- 512 North Branch Blackwater R. at Cortland Co. Rt. 35/18, 6-13-56; Bottom mud, rock; Temp, air 71, water 68; Flow 10 cfs; Depth 2'; Width 20'; Species: *bartoni*, 1 ♀; *orconectes*, 3 ♂♂ I, 5 ♀♀.
- 513 Sand Run on Harpers' Property NE of Cortland on Co. Rt. 37, 6-13-56; Bottom rock, rubble; Temp, air 67, water 67; Flow 5 cfs; Depth 2'; Width 10'; Species: *bartoni*, 4 ♂♂ I, 6 ♀♀; *orconectes*, 2 ♀♀.
- 514 Blackwater R. E of Cortland ½ mi on Co. Rt. 35/18; 6-13-56; Bottom rock and bedrock; Temp, air 67, water 67; Flow 10 cfs; Depth 2'; Width 20'; Species: *bartoni*, 1 ♂ I, 1 ♀; *orconectes*, 10 ♂♂ II, 1 ♀.
- 515 Blackwater R. I, 1 mi E of Bearden Knob 5 mi SE of Davis, 6-14-56; Bottom mud, sand; Temp, air 74, water 66; Flow 30 cfs; Depth 5'; Width 30'; Species: *orconectes*, 4 ♂♂ I, 10 ♀♀.
- 516 Blackwater R. II, 1 mi E of Bearden Knob near Gas well C. & S., 6-14-56; Bottom mud, sand; Temp, air 65, water 61; Flow 25 cfs; Depth 4'; Width 20'; Species: *bartoni*, 3 ♂♂ I, 1 ♂ II, 4 ♀♀.
- 517 Glade Run near Little Blackwater R. in Canaan Valley, 6-14-56; Bottom sand, mud and *Vallisneria*; Temp, air 84, water 75; Flow 5 cfs; Depth 5'; width 10'; Species: *orconectes*, 10 ♀♀ in berry.
- 518* Little Blackwater Cr. E of jct with Blackwater R. 1.5 mi E of Davis, 6-14-56; Bottom mud; Temp, air 67, water 73; Flow 15 cfs; Depth 4'; Width 10'.

- 519* Red Run at first crossing of Rt. 13 USFS from Canaan Heights, east, 6-15-56; Bottom sand, rubble; Temp, air 70, water 58; Flow 15 cfs; Depth 2'; Width 15'.
- 520 Red Run at jct with USFS Rts. 13 and 13a, 6-15-56; Bottom rock, boulder; Temp, air 76, water 57; Flow 20 cfs; Depth 1½'; Width 15'; Species: *bartoni*, 5 ♂♂ I, 1 ♂ II, 8 ♀♀.
- 521 Yellow Cr. Trib. to Blackwater R. 2½ mi E of Davis on Pvt. Road, 6-16-56; Bottom sand, gravel and algae; Temp, air 79, water 67; Flow 5 cfs; Depth 1'; Width 10'; Species: *bartoni*, 2 ♂♂ I, 4 ♀♀.
- 522 Blackwater R. W of Yellow Cr. entry in dam area ¼ mi E of Davis, 6-16-56; Bottom rock, rubble; Temp, air 79, water 67; Flow 10 cfs; Depth 2'; Width 30'; Species: *bartoni*, 1 ♀; *orconectes*, 4 ♂♂ II, 3 ♀♀.
- 523 Devils' Run 1 mi S of Davis on US 32, 6-16-56; Bottom sand, boulders and algae; Temp, air 72, water 67; Flow 5 cfs; Depth 6'; Width 10'; Species: *bartoni*, 14 ♂♂ I, 14 ♀♀.
- 524 Blackwater R. at Davis So. City Limits, Rt. 32, 6-16-56; Bottom sand, rock and boulder; Temp, air 72, water 72; Flow 5 cfs; Depth 3'; Width 75'; Species: *orconectes*, 1 ♂ I.
- 525 North Fork Blackwater R. at Thomas on N Shore of City Park, 6-26-56; Bottom mud, snags, branches; Temp, air 69, water 65; Flow 5 cfs; Depth 18'; Width 125'; On North shore only. Species: *bartoni*, 1 ♂ I, 2 ♀♀; *orconectes*, 2 ♀♀.
- 526 No. 9 Run at Jct. of Rt. 24 and 90, 1 mi NE of Thomas, 6-26-56; Bottom mud, gravel; Temp, air 70, water 69; Flow 5 cfs; Depth 1'; Width 10'; Species: *orconectes*, 15 ♂♂ II, 9 ♀♀.
- 767 No. 9 Run at Jct. of Rt. 24 and 90, 1 mi NE of Thomas, 10-14-56; Bottom mud, gravel; Temp, air 65, water 60; Flow 10 cfs; Depth 1'; Width 10'; Species: *orconectes*, 5 ♂♂ II, 5 ♀♀.
- 527 North Fork Blackwater at William on Rt. 24, first bridge, 6-26-56; Bottom sand, rubble and *Vallisneria*; Temp, air 69, water 59; Flow 5 cfs; Depth 2'; Width 10'; Species: *bartoni*, 3 ♂♂ I; *orconectes*, 1 ♂ I, 14 ♀♀.
- 528* North Fork Blackwater 1.6 mi N of Thomas near Sand Run RR sign and W of Rt. 32, 6-26-56; Bottom mud, debris; Temp, air 72, water 61; Flow 5 cfs; Depth 6'; Width 30'.
- 529* Big Run ½ mi S of Benbush on Parsons-Thomas Rd. 72, 1½ mi NW of Thomas, 6-26-56; Bottom rubble, sand, coal washings; Temp, air 72, water 60; Flow 10 cfs; Depth 1'; Width 10'; Mine activities nearby.
- 530* North Fork Blackwater R. at So. City Limits of Thomas, 6-26-56; Bottom boulder and algae; Temp, air 73, water 62; Flow 45 cfs; Depth 2'; Width 20'.
- 531* North Fork Blackwater R. 1 mi SW of Thomas, ¾ mi NE Douglas at Coketon, 6-26-56; Bottom boulder; Temp, air 83, water 65; Flow 40 cfs; Depth 2'; Width 20'.
- 532 Pendelton Cr. midway between Davis and Thomas on W. Va. 32, 6-26-56; Bottom sand, rubble mud and *Vallisneria*; Temp, air 83, water 70; Flow 5 cfs; Depth 3'; Width 15'; Species: *bartoni*, 4 ♂♂ I, 2 ♀♀.
- 533* Blackwater R. 800' above falls and downstream of new ski lodge bridge, 6-26-56; Bottom boulder; Temp, air 79, water 70; Flow 60 cfs; Depth 2'; Width 40'.
- 534 Beaver Cr. near Gatzmer Mine 6.5 mi NE Davis on Private Rd. 0.5 mi N of Davis, 6-27-56; Bottom sand and rubble; Temp, air 67, water 67; Flow 5 cfs; Depth 5'; Width 15'; Water red from strip mine; Species: *bartoni*, 10 ♂♂ I, 7 ♀♀.
- 535 Beaver Cr. just E of Davis City Limits East on W. Va. 32, 6-26-56; Bottom rock and sand; Temp, air 79, water 70; Flow 10 cfs; Depth 5'; Width 30'; Species: *bartoni*, 1 ♀.
- 536* Beaver Cr. 0.6 mi W of Coll. 534, 6-27-56; Bottom rock and sand; Temp, air 67, water 67; Flow 5 cfs; Depth 1'; Width 10'.
- 537 Beaver Cr. 5 mi E of Davis on Pvt. Rd., 6-27-56; Bottom rock, sand, algae in eddies; Temp, air 67, water 73; Flow 10 cfs; Depth 1'; Width 10'; Species: *bartoni*, 2 ♂♂ I, 2 ♀♀.
- 538 Big Run 0.2 mi NW Red Creek W. Va. on Rt. W. Va. 72 to Hendricks, 6-27-56; Bottom rock and rubble; Temp, air 69, water 64; Flow 15 cfs; Depth 3'; Width 10'; Species: *bartoni*, 16 ♂♂ I, 1 ♂ II, 8 ♀♀.
- 539 Big Run W of first bridge SW of Rt. 72, 6-27-56; Bottom bedrock; Temp, air 69, water 64; Flow 60 cfs; Depth 6'; Width 15'; Species: *bartoni*, 8 ♂♂ I, 5 ♀♀.
- 540* Dry Fork at jct to Laurel Creek at Jenningson, 6-28-56; Bottom boulder, sand; Temp, air 69, water 65; Flow 30 cfs; Depth 18'; Width 75'.

- 541 Dry Fork South of Bridge and at Jenningsston, W. Va. Co. Rt. 35/15, 6-28-56; Bottom Bedrock, sand, boulder and algae; Temp, air 64, water 66; Flow 25 cfs; Depth 6'; Width 75'; Species: *bartoni*, 1 ♂ II, *orconectes*, 1 ♀.
- 542* Laurel Cr. No. of jet with Dry Fork at Jenningsston, 6-28-56; Bottom bedrock; Temp, air 64, water 60; Flow 60 cfs; Depth 2'; Width 60'.
- 543* Dry Fork at Jenningsston Bridge in Deep Hole S of Bridge on Co. Rt. 35, 6-29-56; Bottom boulder, bedrock; Temp, air 68; water 60; Flow 30 cfs; Depth 15'; Width 200'.
- 544* Gladly Fork W of Gladwin on Rt. W. Va. 26, 6-29-56; Bottom bedrock, boulder; Temp, air 68, water 63; Flow 40 cfs; Depth 2'; Width 60'.
- 545 Mill Run $\frac{3}{4}$ mi NW Elk on Rt. 72, 6-29-56; Bottom boulder, rubble and sand; Temp, air 73, water 60; Flow 15 cfs; Depth 1'; Width 10'; Species: *bartoni*, 7 ♂ ♂ I, 7 ♀ ♀.
- 546* Red Run 3 mi SE Hendricks on Rt. 72, 6-29-56; Bottom bedrock and some filamentous algae; Temp, air 73, water 61; Flow 15 cfs; Depth 1'; Width 25'.
- 553 Pleasant Run at Pleasant River, W. Va. 3 mi S Porterwood on Rt. 39 and 47, 7-2-56; Bottom bedrock, rock rubble, algae; Temp, air 79, water 69; Flow 10 cfs; Depth $\frac{1}{2}$ '; Width 10'; Species: *bartoni*, 3 ♂ ♂ I, 6 ♀ ♀.
- 554 Shavers Fork at jet with Pleasant Run 3 mi SW Parsons Rt. 39/47, 7-2-56; Bottom bedrock and boulder; Temp, air 74, water 76; Flow 30 cfs; Depth 3'; Width 150'; Species: *bartoni*, 1 ♂ I.
- 555 Haddix Run at Moore on US 219, 7-2-56; Bottom rock, rubble, clay, algae; Temp, air 74, water 73; Flow 5 cfs; Depth 1'; Width 10'; Species: *bartoni*, 14 ♂ ♂ I, 15 ♀ ♀.
- 556 Haddix Run at Porterwood US 219 and Co. Rt. 39, 7-2-56; Bottom rubble and sand; Temp, air 74, water 80; Flow 10 cfs; Depth 1'; Width 15'; Species: *bartoni*, 2 ♀ ♀; *orconectes*, 1 ♀.
- 557* Shavers Fork at Porterwood on Co. Rt. 39, 7-3-56; Bottom boulders, rock, gravel, sand, mud; Temp, air 74, water 76; Flow 30 cfs; Depth 4'; Width 200'.
- 558* Otter Cr. entry W of Dry Fork 2.5 mi SE Hendricks and W. Va. 72, 7-3-56; Bottom boulder; Temp, air 84, water 70; Flow 10 cfs; Depth 2'; Width 20'.
- 559* Dry Fork N of Otter Cr. and 50' W of W. Va. 72, 7-4-56; Bottom huge round boulder; Temp, air 68, water 73; Flow 20 cfs; Depth 6'; Width 120'.
- 560* Dry Fork at Hambleton E City Limit on W. Va. 72, 7-4-56; Bottom boulders, rock and filamentous algae; Temp, air 73, water 73; Flow 25 cfs; Depth 3'; Width 200'.
- 561* Blackwater River at Hendricks on W. Va. 72, 7-4-56; Bottom boulders; Temp, air 82, water 75; Flow 80 cfs; Depth 2'; Width 50'.
- 562* Black Fork at SE Parsons City Limit, 7-4-56; Bottom rock and boulders; Temp, air 79, water 75; Flow 30 cfs; Depth $1\frac{1}{2}$ '; Width 250'; Water black colored.
- 563 Shavers Fork at Parsons S City Limit opposite fallen brick cylinders and VFW Pond, 7-4-56; Bottom mud, rock, sand and *Vallisneria* in eddies; Temp, air 88, water 77; Flow 20 cfs; Depth 2'; Width 80'; Species: *orconectes*, 5 ♂ ♂ II, 16 ♀ ♀.
- 564* Cheat R. Holly Meadows, 1 mi S via farmers road Rt. 1, 7-5-56; Bottom mud, bedrock, boulders; Temp, air 85, water 79; Flow 50 cfs; Depth 12'; Width 200'.
- 565 Walt Cr. Trib. to Cheat R. 200' from mouth in small pool on Horseshoe-Parsons Rt. 1, 7-5-56; Bottom bedrock and mud; Temp, air 82, water 77; Flow 5 cfs; Depth $\frac{1}{2}$ '; Width 10'; Species: *bartoni*, 5 ♂ ♂ I, 5 ♀ ♀.
- 566 Mill Cr. 4.5 mi SE St. George on Co. Rt. 1, 7-6-56; Bottom bedrock, gravel; Temp, air 71, water 64; Flow 20 cfs; Depth 2'; Width 10'; Species: *bartoni*, 5 ♂ ♂ I, 7 ♀ ♀.
- 567 Horseshoe Cr. 100 yds N of Shafer Co. Rt. 7/3, 7-6-56; Bottom rubble; Temp, air 70, water 66; Flow 5 cfs; Depth 1'; Width 10'; Species: *bartoni*, 4 ♂ ♂ I, 4 ♀ ♀.
- 568 Wolf Run SE of Shafer on Co. Rt. 7/5, 7-6-56; Bottom bedrock, rubble; Temp, air 70, water 65; Flow 10 cfs; Depth 1'; Width 10'; Species: *bartoni*, 2 ♂ ♂ I, 7 ♀ ♀.
- 569 Leadmine Cr. 1 mi N of Leadmine on Rt. 7, 7-6-56; Bottom rubble; Temp, air 70, water 64; Flow 10 cfs; Depth 2'; Width 15'; Species: *bartoni*, 6 ♂ ♂ I, 2 ♀ ♀.
- 570 Horseshoe Cr. at Leadmine on W. Va. 7, 7-6-56; Bottom bedrock and rubble; Temp, air 70, water 67; Flow 15 cfs; Depth 2'; Width 20'; Species: *bartoni*, 2 ♂ ♂ I, 1 ♀.
- 571 Hyle Run 1 mi SW of Leadmine on Location Rd. Rt. 9, 7-6-56; Bottom rubble; Temp, air 72, water 66; Flow 10 cfs; Depth 1'; Width 15'; Species: *bartoni*, 4 ♂ ♂ I, 5 ♀ ♀.

- 572 Maxwell Cr. Trib. to Horseshoe on Rt. 9 and 7 S of Leadmine, 7-6-56; Bottom rubble; Temp, air 72, water 64; Flow 20 cfs; Depth 2'; Width 15'; Species: *bartoni*, 9 ♂♂ I, 6 ♀♀.
- 573 Horseshoe Cr. above Drift Run and near School House on Co. Rt. 9, 7-6-56; Bottom rubble; Temp, air 72, water 68; Flow 20 cfs; Depth 2'; Width 70'; Species: *bartoni*, 3 ♂♂ I, 3 ♀♀.
- 574 Horsecamp Run 3 mi SE of St. George on Co. Rt. 1, 7-6-56; Bottom rubble; Temp, air 72, water 68; Flow 25 cfs; Depth 3'; Width 60'; Species: *bartoni*, 1 ♀.
- 575 Right Fork Clover Run SW of St. George 2½ mi Co. Rt. 15, 7-7-56; Bottom flatrock, rubble; Temp, air 64, water 64; Flow 5 cfs; Depth ½'; Width 10'; Species: *bartoni*, 5 ♂♂ I, 1 ♂ II, 2 ♀♀.
- 576 Indian Fork of Clover Run N of Harper School House and Co. Rt. 17/7, 7-7-56; Bottom flatrock; Temp, air 66, water 67; Flow 5 cfs; Depth ½'; Width 15'; Species: *bartoni*, 2 ♂♂ I, 3 ♀♀.
- 577 Left Fork Clover Run at Harper School on Co. Rt. 8, 7-7-56; Bottom rubble; Temp, air 72, water 67; Flow 10 cfs; Depth 2'; Width 20'; Species: *bartoni*, 4 ♀♀.
- 578 Left Fork Clover Run on Co. Rt. 21, 7-7-56; Bottom rubble; Temp, air 72, water 70; Flow 10 cfs; Depth 2'; Width 40'; Species: *bartoni*, 3 ♀♀.
- 579 Clover Run 2.5 mi SW of St. George Rt. 15/21, 7-7-56; Bottom bedrock, flatrock, rubble; Temp, air 77, water 71; Flow 10 cfs; Depth 2'; Width 30'; Species: *bartoni*, 1 ♂ I, 1 ♀.
- 580* Clover Run at W. Va. Rt. 72 N of St. George 100' W of Cheat River, 7-7-56; Bottom rubble; Temp, air 75, water 72; Flow 10 cfs; Depth 1'; Width 50'.
- 581 Minear Run at Kellar Farm 1 mi NE St. George on Co. Rt. 12, 7-8-56; Bottom bedrock, flatrock; Temp, air 69, water 67; Flow 15 cfs; Depth 2'; Width 15'; Species: *bartoni*, 2 ♂♂ I, 8 ♀♀.
- 582* Minear Run at St. George on Co. Rt. 12, 7-8-56; Bottom, bedrock, flatrock; Temp, air 72, water 67; Flow 15 cfs; Depth 2'; Width 15'.
- 583 Bull Run 4 mi NW of St. George on W. Va. 72 and Co. Rt. 13, 7-8-56; Bottom flatrock; Temp, air 73, water 67; Flow 5 cfs; Depth 1'; Width 15'; Species: *bartoni*, 7 ♂♂ I, 11 ♀♀.
- 584 Licking Cr. near Macedonia Church and jct. Rt. Co. 11 and W. Va. 72, 7-8-56; Bottom rubble; Temp, air 72, water 68; Flow 5 cfs; Depth 1'; Width 15'; Species: *bartoni*, 2 ♂♂ I, 2 ♀♀.
- 591* Cheat R. at Holly Meadows just E of Co. Rt. 1, 7-12-56; Bottom boulder, rubble, Dianthera; Temp, air 80, water 68; Flow 30 cfs; Depth 2'; Width 130'.
- 592* Cheat R. 2 mi SE St. George on Co. Rt. 1, 7-12-56; Bottom boulder, rubble, sand bars, Dianthera; Temp, air 82, water 68; Flow 70 cfs; Depth 2'; Width 300'.
- 593* Cheat R. at St. George W City Limit and near jct of W. Va. 72, 7-12-56; Bottom mud, rock, boulder, Dianthera, Scirpus, Vallisneria; Temp, air 76, water 71; Flow 20 cfs; Depth 3'; Width 240'.
- 594* Cheat R. 500' S of Bull Run entry near Co. Rt. 13 and W. Va. 72, 7-12-56; Bottom rock, rubble; Temp, air 80, water 73; Flow 15 cfs; Depth 2'; Width 250'.
- 595* Cheat R. 1 mi N Hannahsville School and 1 mi S Tucker-Preston Co. line, W. Va. 72 and Co. Rt. 3, 7-13-56; Bottom mud, sand, rock, Dianthera, newfar and chara in eddies; Temp, air 67, water 68; Flow 5 cfs; Depth 3'; Width 300'.
- 596* Cheat R. at Hannahsville 1 mi S Tucker-Preston Co. line on W. Va. 72, 10-14-56; Bottom rubble, sand, whole islands of Dianthera; Temp, air 66, water 69; Flow 30 cfs; Depth 2'; Width 300'.
- USNM 23964 No. Fork of Blackwater at Courtland, 8-25-99; Hobbs determined 1954; Species: *carinirostris*, 10 ♂♂ I, 7 ♂♂ II, 6 ♂♂ imm., 11 ♀♀, 4 ♀♀ imm.
- USNM 23965 Blackwater R. 2 mi above Courtland, 8-25-99; Faxon determined, Hobbs checked 1954; Species: *carinirostris*, 21 ♂♂ II, 250 ♀♀.
- USNM 23966 Blackwater R. 2 mi above Courtland, 8-25-99; Hobbs checked 1954; Species: *carinirostris*, 14 ♂♂ I, 12 ♂♂ II, 46 ♀♀.
- USNM 23970 Red Cr. at jct with Dry Fork of Cheat R., 8-26-99; Hay determined, Hobbs checked 1954; Species: *carinirostris*, 1 ♂ I, 2 ♀♀.
- Unknown County (Randolph or Pocahontas)**
- USNM 23969 Shavers Fork, 7-9-99; Hay determined, Hobbs checked 1954; Species: *carinirostris*, 3 ♂♂ I, 1 ♂ II, 1 ♂ imm., 7 ♀♀.

Summary

Only two species of crayfish were currently encountered in the Cheat River watershed of West Virginia and Pennsylvania as tributary to the Monongahela-Ohio River systems. These were 1155 specimens of *Cambarus bartoni bartoni* and 269 specimens of *Orconectes obscurus*. Recorded specimens exist for two other species, *Cambarus bartoni carinirostris* and *Cambarus carolinus carolinus*. However, either as a result of their burrowing habits (*C. carolinus*) or perhaps possible recent extirpation (*C. b. carinirostris*), these were not captured within the streams sampled. A total of 233 collections was made throughout the Cheat watershed during 1956. Of these, 153 collections, 66.0 percent, contained samples of crayfish whereas 80 samples (34 percent) were void of crayfish. In 138 samples, *Cambarus b. bartoni* occurred alone. *Orconectes obscurus* occurred alone in 34 collections while in only 19 collections did the two species occur together. Generally, *Cambarus b. bartoni* was the most widely distributed species. *Orconectes obscurus* occupied the larger foothill streams and was replaced at higher elevations or in faster flowing streams by *C. b. bartoni*. Both species were conspicuously absent from the main central portion of the watershed.

Apparent disagreements exist between various crayfish specialists regarding the identity and/or presence of *C. b. carinirostris* in the Blackwater River portion of the system. Further study will be necessary to delineate the subspecies *carinirostris* from *bartoni*.

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